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Hong Yu Da

CNC Technology

XPTHC-200

Arc Voltage Height Controller

Arc Voltage Height Controller

User's manual

Shenzhen HongYuDa CNC Technology Co.,Ltd.

Preface

XPTHC-200 Arc Voltage Height Controller integrated the company's designers over 10 years experience in the Plasma Automatic Height Control design and applications, with reference to the advantages and disadvantages of a large number of arc voltage home and abroad. Its design not only inherits high-precision and high reliability of XPTHC-100, also takes the user's requirement into account to make the XPTHC-200 more flexible to use, and easier to install, smaller, higher anti-interference performance,and a greater range of applications.

Quality Assurance

In order to thank customers' support for the development of our company, HongYuDa provides a high degree of quality of two years warranty for the new XPTHC-200 Arc-voltage controller. From the date of delivery, if the device can not work well due to the failure of our product, our company offers free repair or replacement. This guarantee does not apply to any damaged products caused by incorrect assembly and modification. Through negotiation, users can freely choose free repair, replacement or adjust any products within the scope of this guarantee.

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1. Brief Introduction

1.1. Product Model:

XPTHC-200

1.2. Chinese Name:

Arc voltage height controller（弧压高度控制器）

1.3. Application scope

Cutting torch height control for plasma cutting machine with constant-current characteristics or with a constant-current characteristics in a certain voltage range, it is suitable for most imported model or home products, it also applies to automatic height control for automatic submerged arc welding and automatic argon arc welding.

Structure (see Figure 1-1)

1.4. Structure (see Figure 1-1)

XPTHC-200 torch height controller is comprised of following parts:

A. Master controller of XPTHC-200: Installed at a location convenient to operate。

B. XPTHC-200-IHS: positioning, arc striking, partial pressure controller. On the one hand, the controller used to connect the arc voltage signal and arc striking signal of plasma; on the other hand, it provides initial positioning.to protective cap contact positioning interface and switch positioning interface. It can be installed at cutting torch lifter, the entrance of towline, inside the CNC cabinet, but it is better to be installed at cutting torch lifter.

C. Control Cable: This product offers three cables to facilitate users:

1) 200101: connecting cable between XPTHC-200's master controller and XPTHC-200-IHS, it has standard length of ten meters, eight meters and six meters are for optional.

2) 200062: connecting cable between XPTHC-200's master controller and the NC, it has standard length of six meters.

3) 200064: protective cap contact positioning cable with magnetic ring, it has standard length of four meters, and it can be customized.

XPTHC-200 主控制器正面

XPTHC-200-IHS 控制器

POWER
AC24V

GND

Connected to the CNC control circuit

Connected to the cutting torch motor and limit place

XPTHC-200 主控制器背面

开关定位接口

GND

保护帽定位检测信号

Plasma start single

Plasma ARC-Voltage

XPTHC-200-IHS 控制器内部

Figure 1-1: Structure

1.5. Installation

XPTHC-200's master controller: Installed at a location convenient to operate. Installation dimensions are as follows in Figure 1-2:

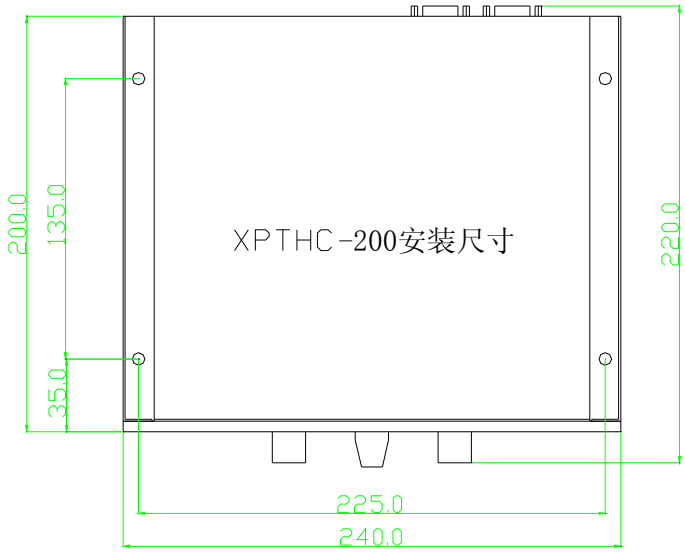


Figure 1-2 XPTHC-200 installation dimensions

XPTHC-200-IHS: positioning, arc striking, partial pressure controller can be installed at cutting torch lifter, the entrance of towline, inside the CNC cabinet, but it is better to be installed at cutting torch lifter. Installation dimensions are as follows in Figure 1-3:

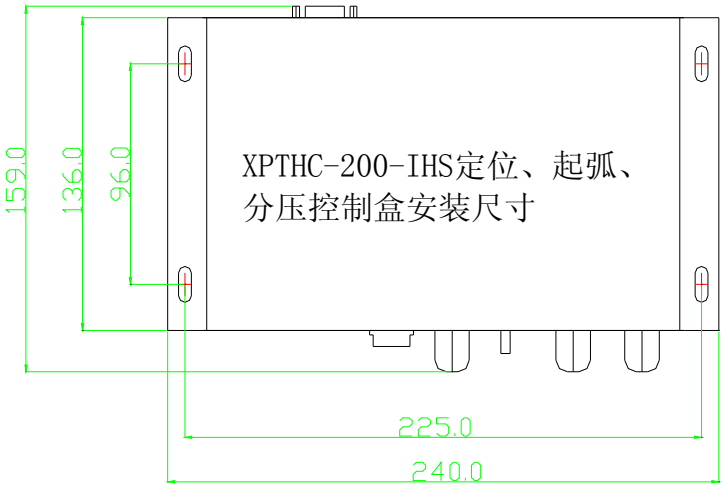


Figure 1-3 XPTHC-200-IHS installation dimensions

1.6. Working principle

The working principle of XPTHC-200 plasma arc voltage height controller is to use characteristics of the basic constant-current of plasma current to achieve the height control of cutting torch by detecting changes in plasma arc voltage to detect the change of height of cutting torch in the process of plasma cutting.

1.7. Basic functions and features

Automatic initial positioning, two-speed positioning.

Detection method of switch positioning:

Proximity switches of XPTHC-200 are NPN normally-open proximity switches, under the normal condition the switch is in contact state, proximity switches can also be replaced with contact switch. In any state when the cutting torch touches the steel plate,, the detection circuit acts and the torch will go to the original height, the height to the plate can be set through SET-IHS potentiometer. When switches disengaged for a long time, the cutting torch is always rising at the fastest speed, until the torch up to the maximum of high limit, therefore, the switch has anti-collision protection function.

Detection method of protection cap collision:

The cutting torch cap touches the steel plate, and after the height turner received the in positioning trigger signal, the cutting torch will be elevated to positioning height.

Two-speed positioning:

In the initial positioning process, after the height turner received the arc striking command, it will descend at the fastest speed for two seconds and automatically switch to slow descending, when the cutting torch touches steel plate to be cut and trigger positioning signal, the height turner control the cutting torch elevating to the positioning height. Through the two-speed positioning, it can improve positioning accuracy and extend the life of cutting torch protective cap.

A. Separately set different operation speed

The elevating speed, descending speed and positioning speed of the system divide into three gears, it can be set through simple band switching in circuit.

B. Automatic arc voltage height control

When the height turner is in automatic mode, If the actual arc voltage is less than set arc voltage 30V, the height turner is in automatic mode.

C. Given arc voltage and actual arc voltage display control function:

Show the given arc voltage before arc striking, and show the actual arc voltage after the arc striking perforation delay.

D. A variety of positioning functions:

The system can use protective cap contact positioning mode and proximity switches positioning mode simultaneously. Usually both modes can be applied to water cutting. When performing underwater cutting, it is better to use proximity switches positioning mode. The advantages of using two-speed positioning in water cutting are: when cutting rusty plate, the protective cap positioning may lead invalid positioning due to poor contact with rust plate, when proximity switches positioning will act which can complete the positioning effectively. It will be better if mated with our positioning fixture.

E. Cutting torch automatic elevating after completion:

When CNC cutting off the signal, the height turner will elevate the cutting torch automatically for three seconds.

F. Arc voltage enable signal output:

By setting the panel on the SET-PIERE potentiometer to delay the output of the signal, the signal is realized by testing whether there are arc voltage the output signal is digital(binary).

G. Manual operation:

The functions, such as manual and automatic choose, manual elevating and descending, testing of initial positioning and testing of arc striking, can be achieved on the operation panel.

H. Automatic operation:

After the signals are sent by cutting program, the arc voltage height controller automatically finished process of initial positioning---arc striking--arc voltage enable, NC control the machine tools to cut after received arc voltage enable signal.

I. Anti-collision function:

In the automatic cutting process, if you set the arc voltage too low or because of nozzle loss lead to cutting torch hit the plates, the height turner will automatically send elevating signal to prevent cutting torch from pressing the steel plate and destroy the cutting torch. It is better to be mated with our anti-collision fixture. It will not only send elevating signal to height turner, but also send anti-collision signal to CNC to stop the cutting. In non-cutting process, as long as the cutting torch hit the steel, it will automatically raise an initial positioning height.

1.8 Arc voltage detection method:

Isolated partial pressure detection. Partial pressure ratio is **50:1.**

2. Specifications

Working voltage: AC24V +10%, 50Hz/60Hz

Lifting motor: DC24V DC motor

Drive mode: PWM (Pulse width modulation)

Output current: 1A-4A, maximum 16A.

Output power: 100W, (according to user requirements, maximum to 300W)

Working temperature: -10 ∽ 60 ℃ increase in device

Initial positioning mode: Switching positioning

Protective cap contact positioning

Transmission: detecting arc voltage enable, perforation completion output

Partial pressure ratio: 50:1

Accuracy: ±1V∽±3V, related with user's motor starting voltage.

Outer dimensions: Length X Width X High: 240mmX200mmX80mm.

Cutting torch elevating speed: 1,000 m / min ∽ 4000 m / min (please contact the supplier if exceed the speed)

Set arc voltage range: 30V∽250V, it can be modified according to different applications.

3. Working process

3.1. Working process with initial positioning

When arc striking signal connected to NC system is "arc striking signal with initial positioning", the height turner will first perform initial positioning, when it is done, the height turner automatically control arc striking of plasma, after the plasma produce transferred arc, the height turner send arc voltage enable signal to NC system, and NC system starts cutting operation. When the height turner send arc striking signal to plasma, it delayed arc voltage to arc voltage controller system, after the arc voltage is pull in, if the height turner itself is in automatic permit situation and NC system has sent the signal of automatic elevating, the height turner is in automatic elevating state.

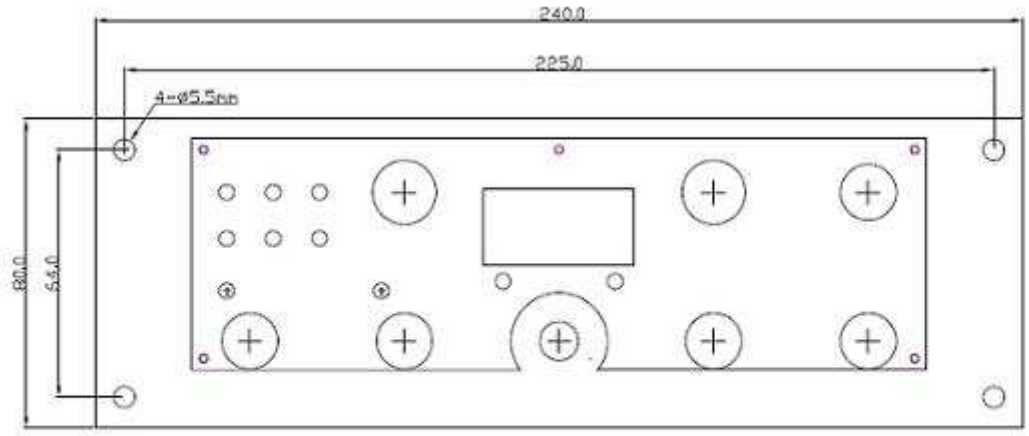
3.2. Direct arc striking process:

When the arc striking signal connected to NC system is "arc striking signal without initial positioning", the height turner does not perform initial positioning and directly control the arc striking of plasma. After the plasma produce transferred arc, the height turner send arc voltage enable signal to NC system, and NC system starts cutting operation. When the height turner send arc striking signal to plasma, it leads the arc voltage to arc voltage controller system, after the arc voltage is pull in, if the height turner itself is in automatic permit situation and NC system has sent the signal of automatic elevating, the height turner is in automatic elevating state.

4. Master controller of XPTHC-200

4.1. Control panel of XPTH-200

Panel and size diagram shown in Figure 4-1:



Operation-Panel Size

图 4-1：操作面板

Figure 4-1: Control panel

Arc voltage display: The "SET" indicator light shows given arc voltage on control panel, after arc striking and the setting of "Set Piere", it shows the actual arc voltage, then the "Actual" light is on.

Arc voltage settings: According to the thickness, speed of cutting material and parameters of the plasma to set the cutting arc voltage, the arc voltage can be shown on arc voltage display before arc striking. The value of given arc voltage determines the cutting height, if the given arc voltage increases, the cutting height also increases, in the automatic cutting process, adjusts the given arc voltage to regulate cutting height.

Initial height setting potentiometer: Set the height of initial position, clockwise rotation and height increase. The height of initial positioning achieved through the delayed mode.

Initial height setting test button: Filmed button, press first when it is not cutting to perform initial height setting test, it is mainly to check that the initial height setting is suitable or not. Press the button or "UP" during the positioning process to cancel the positioning.

Set pierce: Set the time starting from plasma arc striking to CNC machine running, only detected arc voltage to send arc voltage enable signal. Arc voltage enable signal is switch output mode.

Automatically elevate button(Auto): filmed button.

To make height turner in automatic mode, the "INAUTO" indicator on the "AUTO" must light, every time to press "AUTO" button, the "INAUTO" indicator will flip once. Only "INAUTO" indicator lights and NC systems and height turner's interface send enable signal, the height turner is in automatic status.

Arc striking test: filmed button:press the button and start the test of plasma arc striking, release the button and the cutting torch will automatically elevate for three seconds.

UP button (UP): filmed button. Manual UP button. Valid under any condition, up has priority to down.

DOWN button (DOWN): filmed button. Manual DOWN button. Valid under any condition, up has priority to down.

DOWN indicator light: light when descend.

PUMP indicator: it will be on when cutting torch touches steel plate or proximity switch detaches to trigger positioning.

ARCON indicator: arc striking indicator, the indicator lights to show arc striking operation has been carried out. Attention: when using "arc striking signal with initial positioning" to conduct the cutting process, the indicator does not light in initial height setting process, it must wait until the completion of positioning signal is detected, the indicator will light.

TRANS indicator: when it is on which indicate that the system has detected the arc voltage and has sent the arc voltage enable signal.

AUTO indicator: when it is on which indicate that height turner is in automatic mode, to turn on the light, it should meet four conditions:

1. Control panel automatic signal have been loaded;

2. The automatic signal connected to NC system enable;

3. The controller detects arc voltage (arc voltage has been led);

4. The actual arc voltage does not exceed a given arc voltage of 30V. Note: The over-voltage protection of height turner is 30V, it can be changed by adjustment of RP104 according to actual needs of customers, clockwise to reduce the voltage.

UP indicator: light when ascend.

INAUTO indicator: Default light in booting, through the "AUTO" button to control its status.

IHSTEST indicator: initial height settings indicator on control panel, only light in the initial height settings process and will turn off after the positioning, it is invalid under in automatic mode.

SET indicator: set arc voltage display, light when it is not working or without arc voltage input.

ACTUAL indicator: The actual arc voltage display indicator, light when arc voltage input.

Please attention:

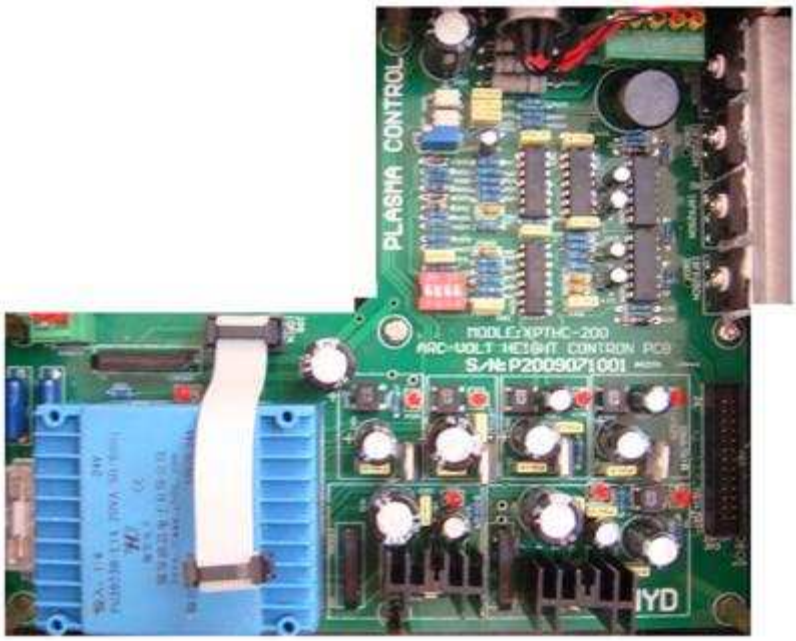
A. The five indicator with silver circle on control panel light to indicate the height turner is in automatic mode. If one of them does not light, the height turner is not in automatic mode, increased device automatic increase in the state, panel 5 silver circle lights are bright. You can determine the reasons of failure through the control panel.

B. There are six indicators on upper right corner of control panel, which show the timing sequence of height turner from positioning>>>collision>>>arc striking>>>arc feedback>>>automatic process, you can determine the reasons of failure through timing sequence.

Figure 4-2 are three circuit boards in XPTHC-200 height turner:

Control panel

Arc voltage control panel



Motor driving board

Figure 4-2: XPTHC-200 internal circuit boards

4.2. Settings of XPTHC-200

4.2.1. Settings of ascending speed

XPTHC-200 sets manual and outer controlled ascending speed through two-band switch SUP1 (on the arc voltage control panel), but ascending speed in automatic mode are not related with the settings. It is only related with the settings of sensitivity. See figure 4-3

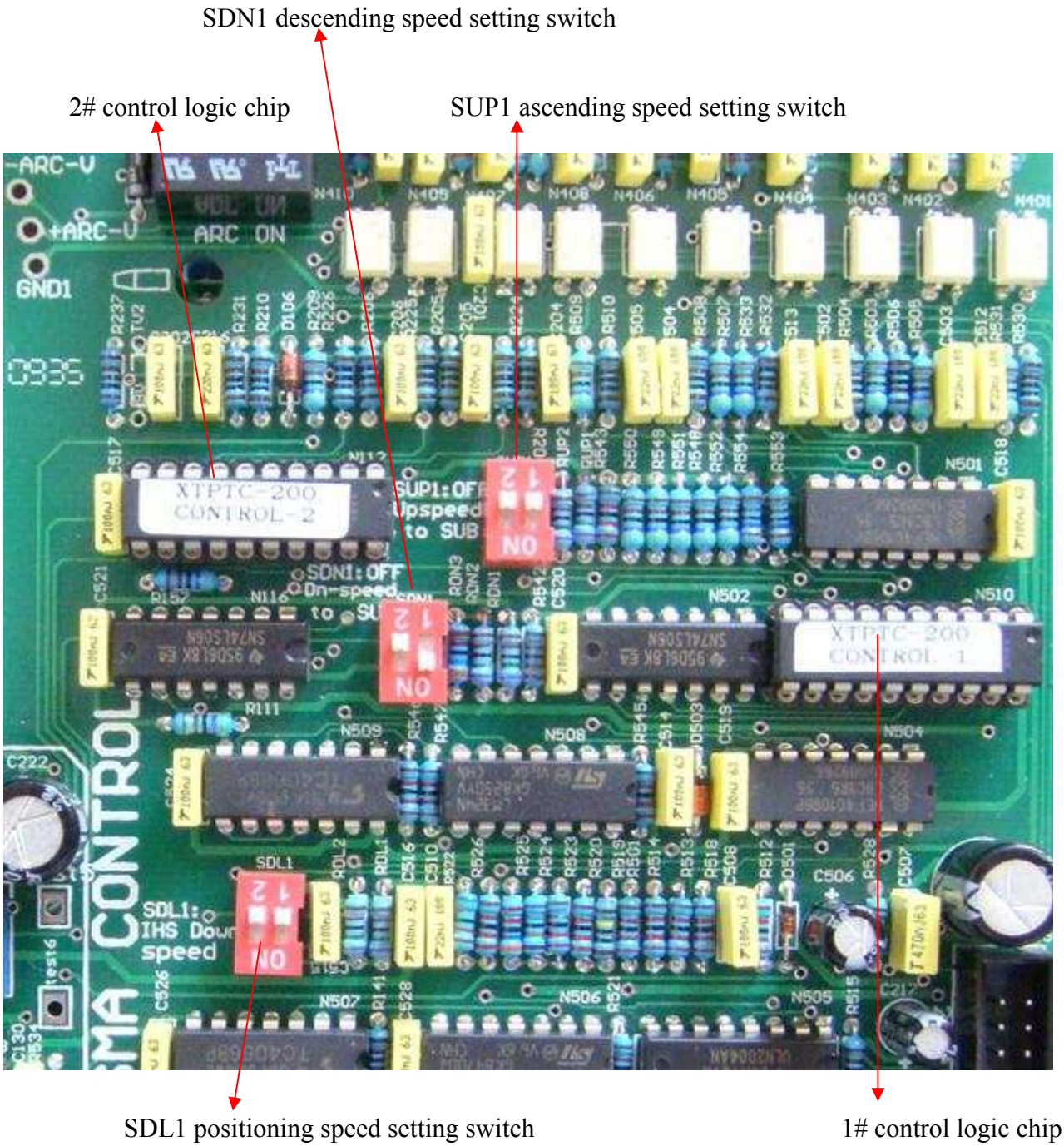


Figure 4-3: location of speed setting band switch

Ascending speed setting method of SUP1:

Ascending speed	1-4	2-3
High speed	ON	ON
Medium speed （default）	ON	OFF
	OFF	ON
Low speed	OFF	OFF

4.2.2. Settings of descending speed

XPTHC-200 sets manual and outer controlled descending speed through two-band switch SDN1 (on the arc voltage control panel), but descending speed in automatic mode are not related with the settings. It is only related with the settings of sensitivity. See figure 4-3

Ascending speed setting method of SDN1:

Descending speed	1-4	2-3
High speed	ON	ON
Medium speed （default）	ON	OFF
	OFF	ON
Low speed	OFF	OFF

4.2.3. Settings of low speed positioning

XPTHC-200 sets descending speed of low speed positioning through two-band switch SDN1 (on the arc voltage control panel).

See figure 4-3

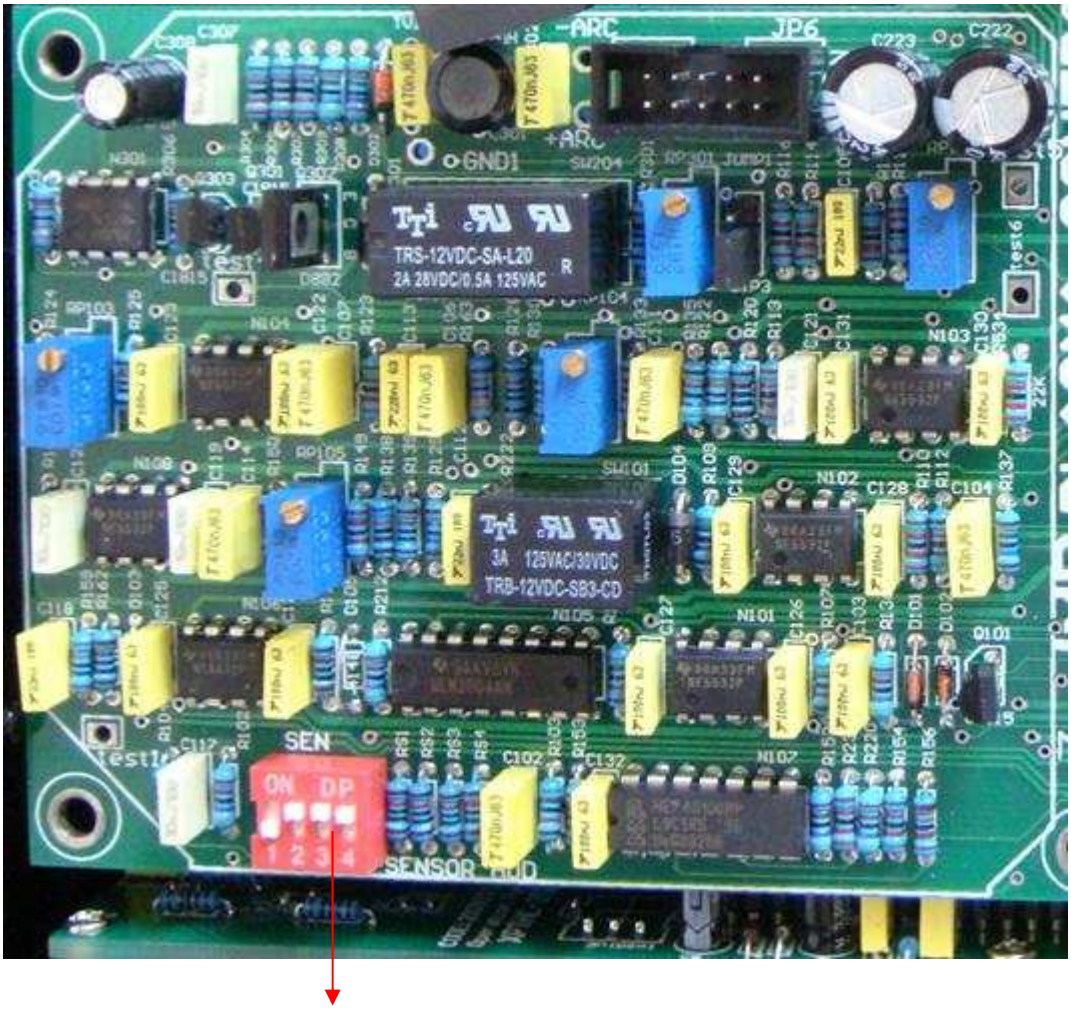
Descending speed of positioning setting method of SDL1:

Descending speed	1-4	2-3
High speed	ON	ON
Medium speed （default）	ON	OFF
	OFF	ON
Low speed	OFF	OFF

4.2.4. Settings of response sensitivity of height turner

The sensitivity of height turner is set up through the 4-band switch SEN (on the arc voltage control panel). The level of sensitivity determines the precision of arc voltage height turner, because the lifter's speed of cutting torch of each user are inconsistent, in order to match the vast majority of users, XPTHC-200 designed a 5-speed precision settings.

Location of sensitivity setting switch, see figure 4-4:



ensitivity setting switch

Figure 4-4: Sensitivity setting band switch

Sensitivity setting method of SEN:

Sensitivity	1-8	2-7	3-6	4-5	Notes
1	OFF	OFF	OFF	OFF	1 for the highest, 5 for the lowest.
2	ON	OFF	OFF	OFF	
3	ON	ON	OFF	OFF	
4	ON	ON	ON	OFF	
5	ON	ON	ON	ON	

Note of sensitivity settings:

Increasing sensitivity can get high cutting accuracy, but when the sensitivity is too high which will produce oscillations to produce opposite effect, so it is essential to select the appropriate sensitivity for normal use of height turner.

A. The device sensitivity settings is in the "5" position (the lowest).

B. Increase the sensitivity should set up based on the difference of set arc voltage and the

actual arc voltage, the deviation is in normal range of 1 ~ 3V, if the deviation exceeds 3V, please increase sensitivity.

C. The increase in sensitivity should be progressively increased, do not put it to the highest location.

D. When users determined the location, they can tell our company, we will set up it in default.

4.2.5. Settings of motor drive current:

Motor drive current setting switch is SP2, installed in the motor drive board.

See figure 4-5

Current setting method:

Current	1-8	2-7	3-6	4-5
4A(4~16A)	OFF：PWM=9KHZ	OFF	OFF	OFF
3A		OFF	OFF	ON
2A	ON：PWM=18KHZ	OFF	ON	ON
1A		ON	ON	ON

Expanding output current of motor drive board can be achieved by increasing the size of current-feedback resistor, to achieved paralleled 1Ω, 2W resistors with R6301 ~ R6303, for each added resistor, the current increase 1.5A.

4.2.6. Adjustment of motor plug braking

XPTHC-200 height turner use motor plug braking to achieve fast braking. In this product, to adjust the motor plug braking in an appropriate range by set the adjustable resistor R6012 on driver board. See figure 4-5.

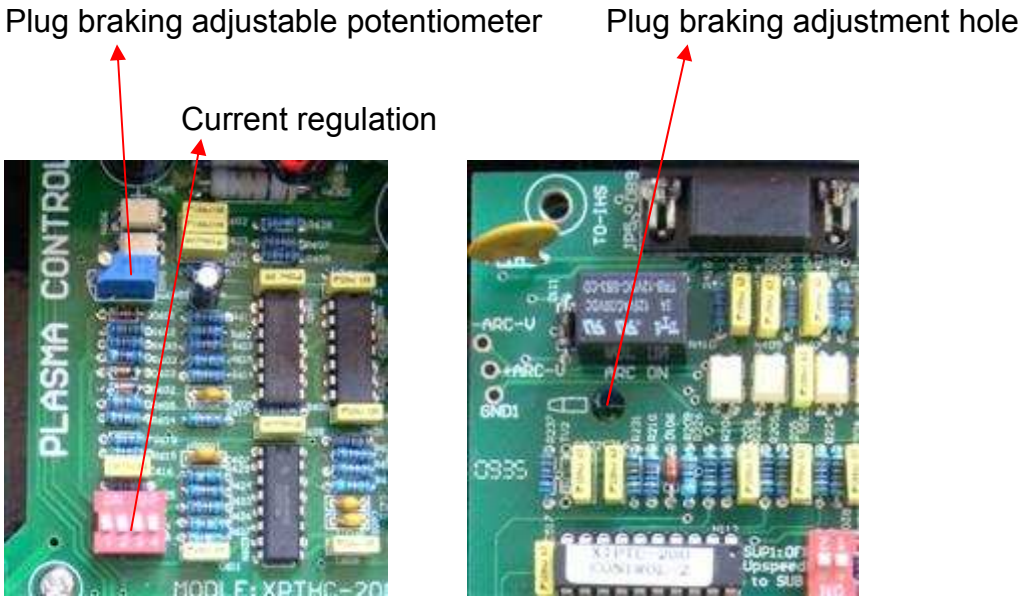


Figure 4-5: Current regulation and plug braking adjustment

After the installation of internal circuit board of height turner, set the plug braking by a

screwdriver through the hole on arc voltage control panel. See figure 4-5.

Before delivery, plug braking of height turner has been adjusted, and need not to adjust by users, but because transport, aging and device stability may cause braking deviation, users can also adjust accordingly.

4.3. Interfaces of XPTHC-200 controller

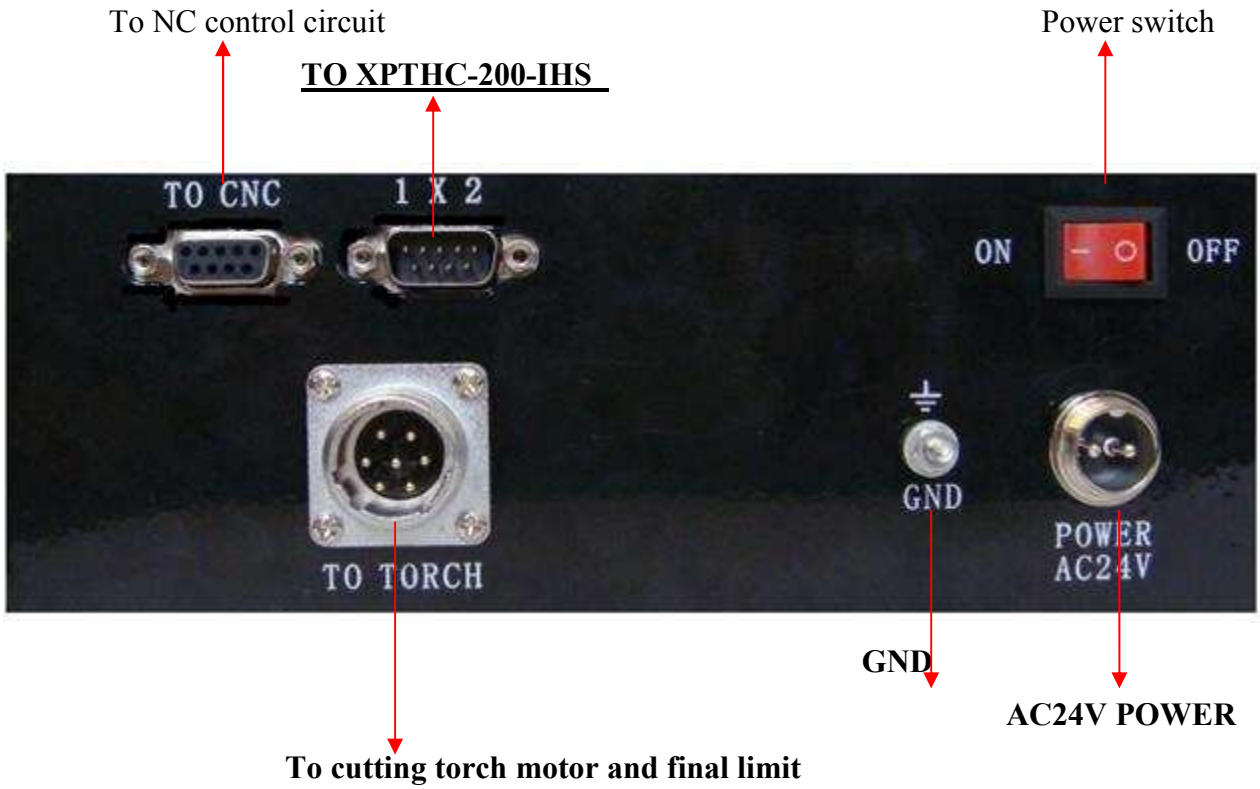


Figure 4-6 Controller Interface

4.3.1. Power port

XPTHC-200 uses AC24V power supply, input to height turner through Φ16 aviation jack, the power of AC24V power supply is determined by motor power, and choose the power of transformer according to the following formula. See figure 4-6:

Transformer power = motor power + 25

4.3.2. Cutting torch lift interface

Torch lift interface uses 7-pin aviation jack to connect with motor, aviation jack is defined as follows in figure 4-7:

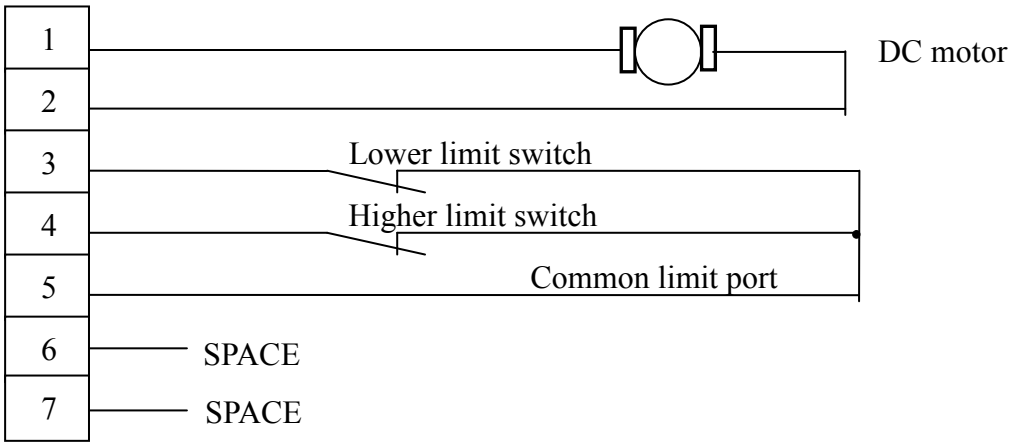


Figure 4-7: Cutting torch lift interface circuit diagram

Ascending and descending limit interface diagram in Figure 4-8:

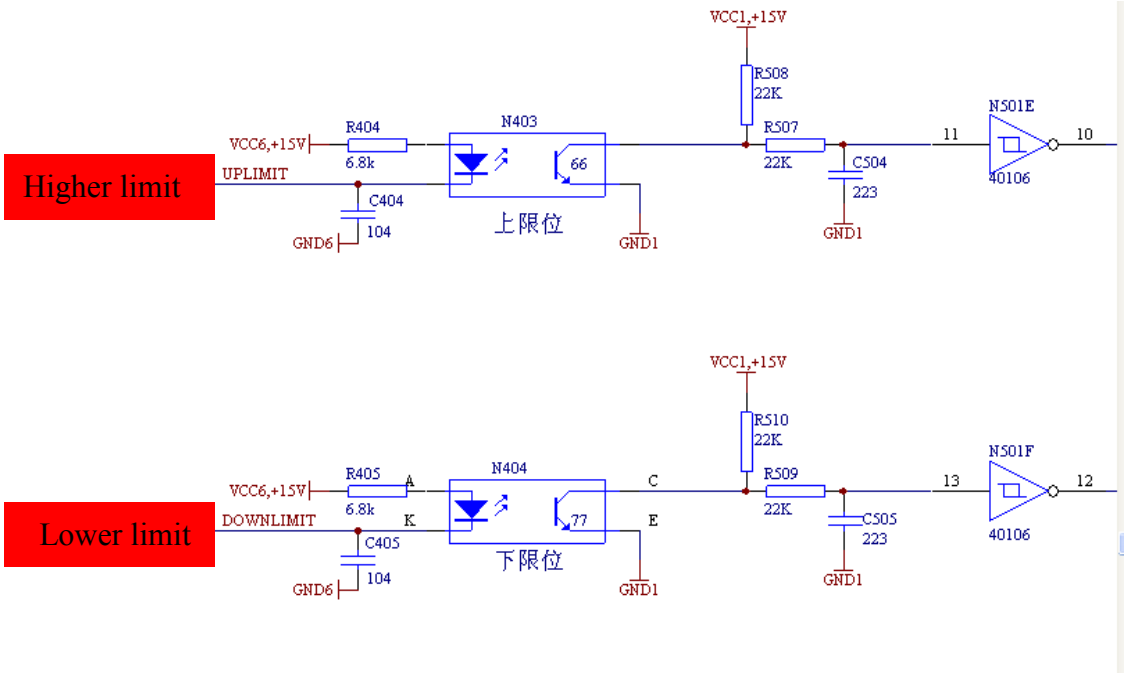


Figure 4-8: Higher limit and lower limit interfaces

Note: Usually, the limit switch of XPTHC-200 uses normally closed contact. But it also can change to normally open contacts by change the program logic according to users requirements.

4.3.3. Interface connected to NC circuit

Through a female DB9 socket connected to CNC system. Pins definition are in figure 4-9

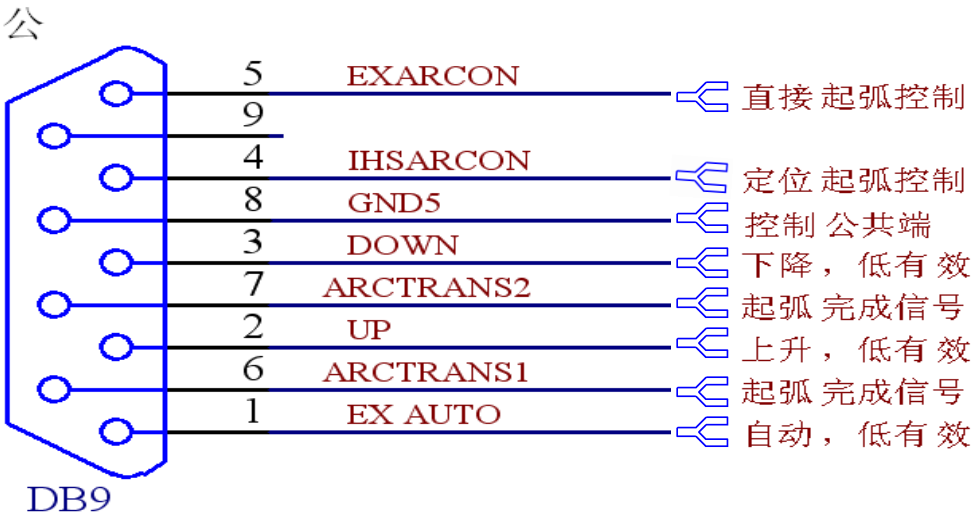


Figure 4-9 definition of the interface connected to NC system

Notes:

All signals connected to NC system are using isolation mode, with active low.

Arc striking completion signal (ARCTRANS1, ARCTRANS2) is a switch signal.

The cable supplied by our company, the cable number is 200062 with a standard length of five meters.

Internal schematic diagram of XPTHC-200, see figure 4-10:

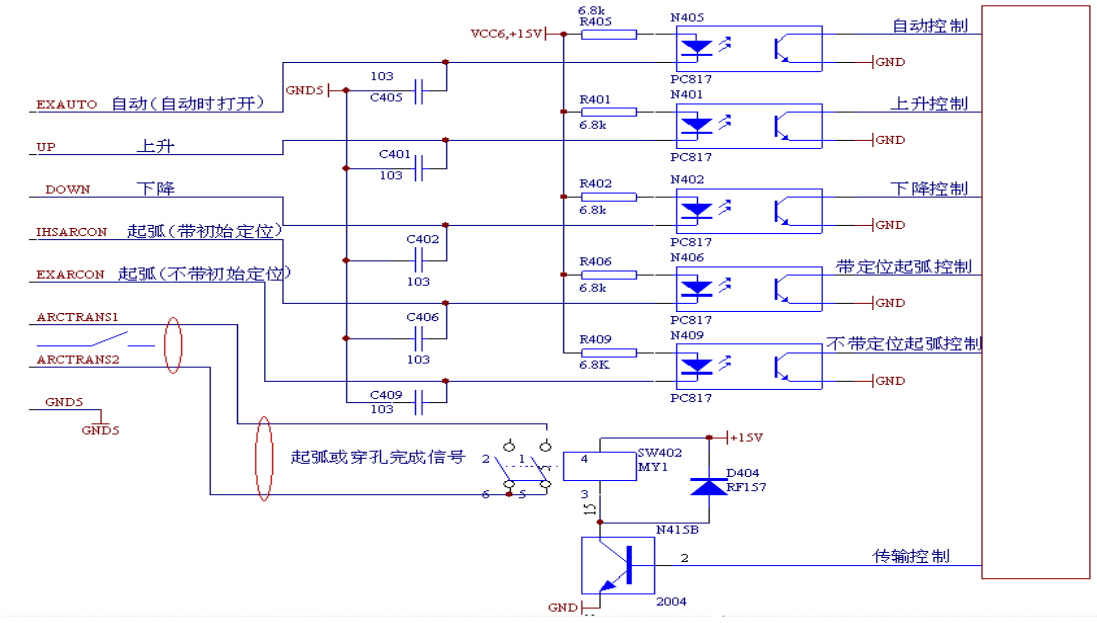


Figure 4-10: Schematic diagram connected to NC circuit

4.3.4. Connecting to the interface of XPTHC-200-IHS

The cable uses eight-core four pairs twisted shielded cable, the cable provided by our company, number 200101, the standard length is ten meters, 8 meters and 6 meters for option.

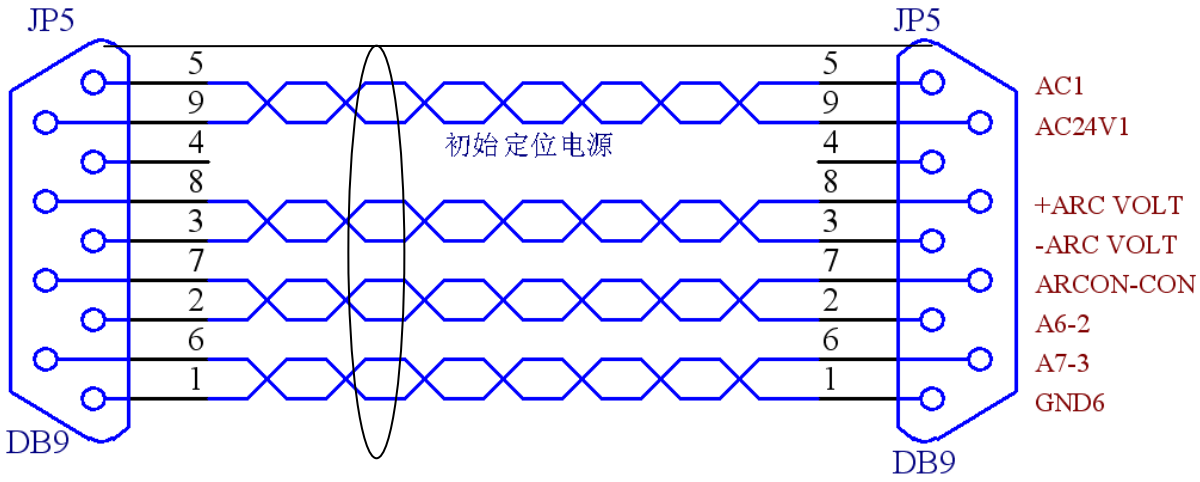


Figure 4-11: XPTHC-200 and XPTHC-200-IHS cables

5. XPTHC-200-IHS partial pressure, positioning and arc striking controller

5.1、Functions of XPTHC-200-IHS

XPTHC-200-IHS separates the signals of plasma arc voltage and arc striking with strong interference from master controller in order to improve the system's anti-jamming capability, the signals between them are using isolation connection mode, at the same time, it tries to shorten the distance from cutting torch to IHS positioning controller, which effectively avoid the interference of plasma system to master controller and NC system, and improve stability of the system.

5.2. Isolation partial pressure method

Voltage division circuit conducts 50:1 non-isolated partial pressure according to diagram shown in figure 5-1, then after 1:1 isolating process, it connects to height turner, therefore, arc voltage be isolated has small interference to height turning.

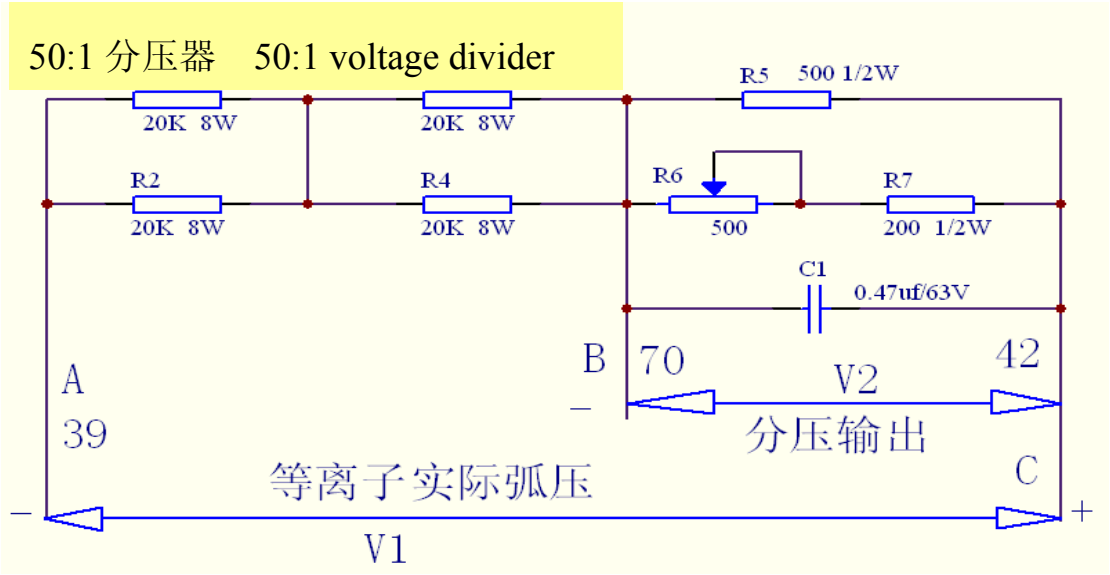


Figure 5-1: Non-isolated partial pressure

In actual practice, the arc voltage after voltage division is delayed and connected to control circuit.

Plasma using high-frequency arc, please extend pierce time to avoid the high-frequency lead to height turner.

5.3. Settings of initial positioning

5.3.1. Cutting torch protective cap positioning mode

The initial positioning interface of XPTHC-200 realizes in XPTHC-200-IHS, it is needed to set up XPTHC-200-IHS only when using proximity switches to position. See figure 5-2.

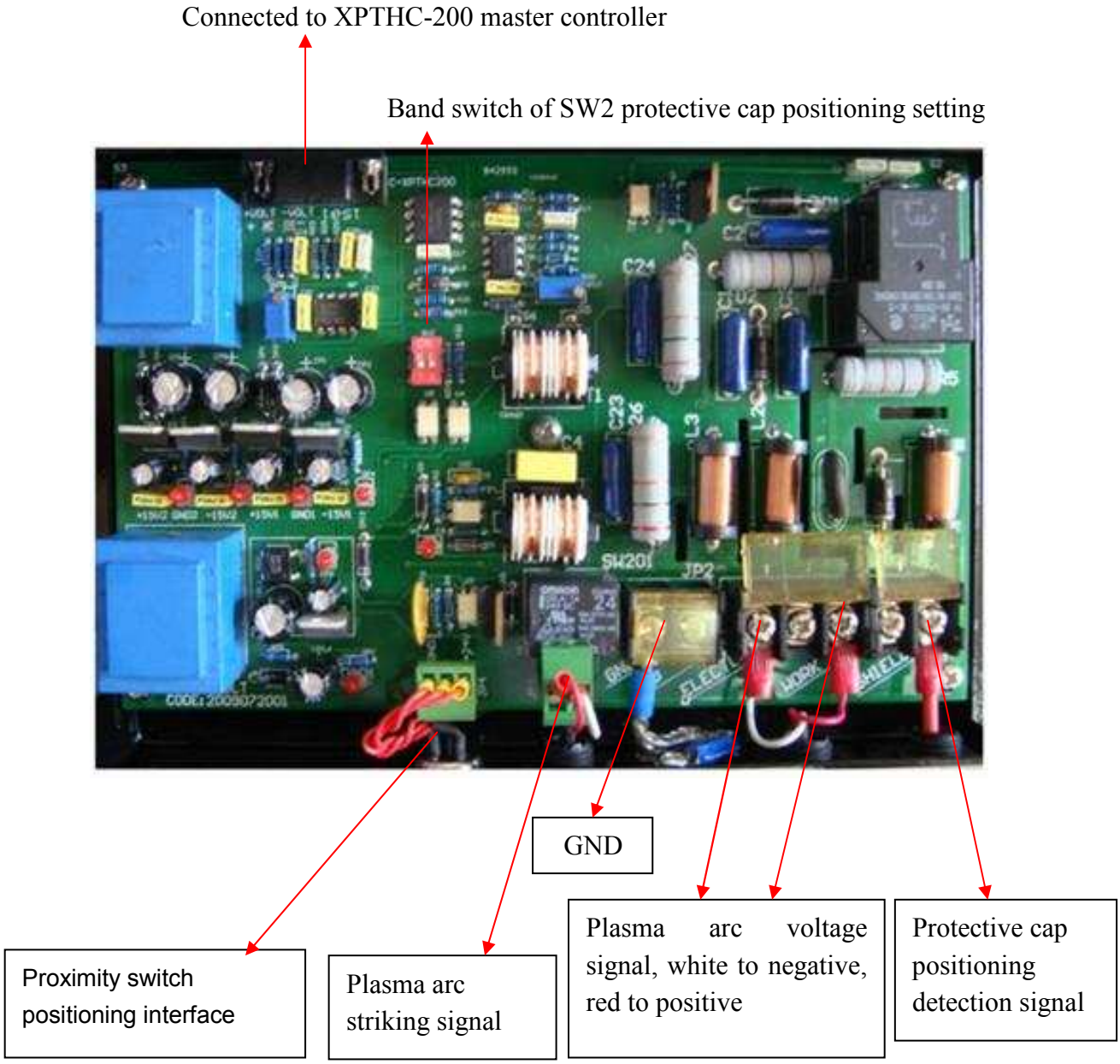

Connected to XPTHC-200 master controller
Band switch of SW2 protective cap positioning setting
GND
Proximity switch positioning interface
Plasma arc striking signal
Plasma arc voltage signal, white to negative, red to positive
Protective cap positioning detection signal

Figure 5-2

SW2 band switches must all be OFF only when using protective cap to position.

5.3.2. NPN normally open proximity switch positioning mode

SW2 must all be ON when using proximity switch positioning mode, then the protective cap contact positioning is still valid.

5.4. Interface of XPTHC-200-IHS

5.4.1. Connected to XPTHC-200

Use cable numbered 200101 to connect the two controllers, the cable is supplied by our

company with the standard length of 10 meters, 8 meters and 6 meters for option. See figure 5-3

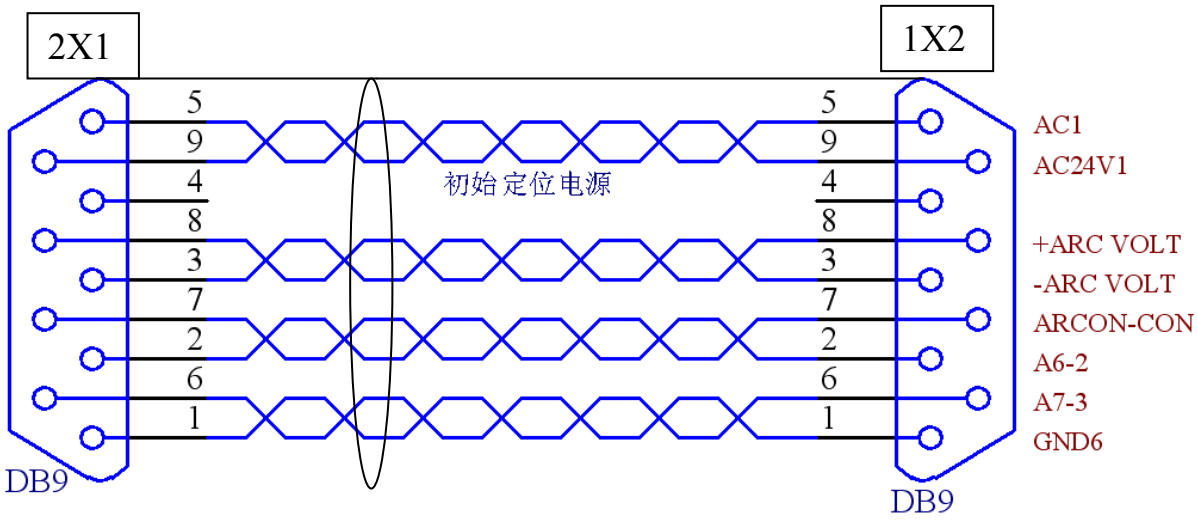
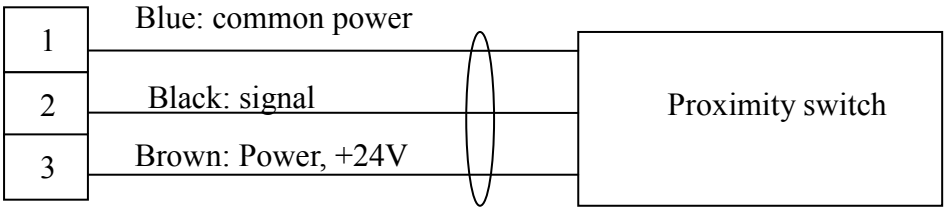


Figure 5-3 (the same as Figure 4-11)



3 芯航插 3-pin aviation jack

Figure 5-4:

5.4.2. Proximity switch positioning interface

Positioning port of proximity switch connected with a Φ16 3-pin aviation jack, labelled "Switch IHS", pin is defined as follows in Figure 5-4:

Note: A 250mA self-recovery fuse is installed in power supply section of proximity switch in the controller in order to prevent the switch from faulting, and damage power supply.

Working process: when the height turner received the arc striking signal sent by NC system, the cutting torch descends immediately, when it touches steel plate, proximity switch detaches the point, height turner receives the signal and controls the cutting torch ascending to set height immediately (in ascending process, the proximity switch will automatically reset), when positioning completed, height turner controls plasma arc striking automatically. This method applies to all plasma initial positioning.

5.4.3. Protective cap positioning interface

The positioning mode requires that the protective cap is metal structure which can conduct each other. The positioning cables is accessed in "SHIELD" of XPTHC-200-IHS.

For the Protection Cap of plasma is ceramic, it can install a metal ring to realize protective cap positioning. Connection diagram as shown in Figure 5-5:

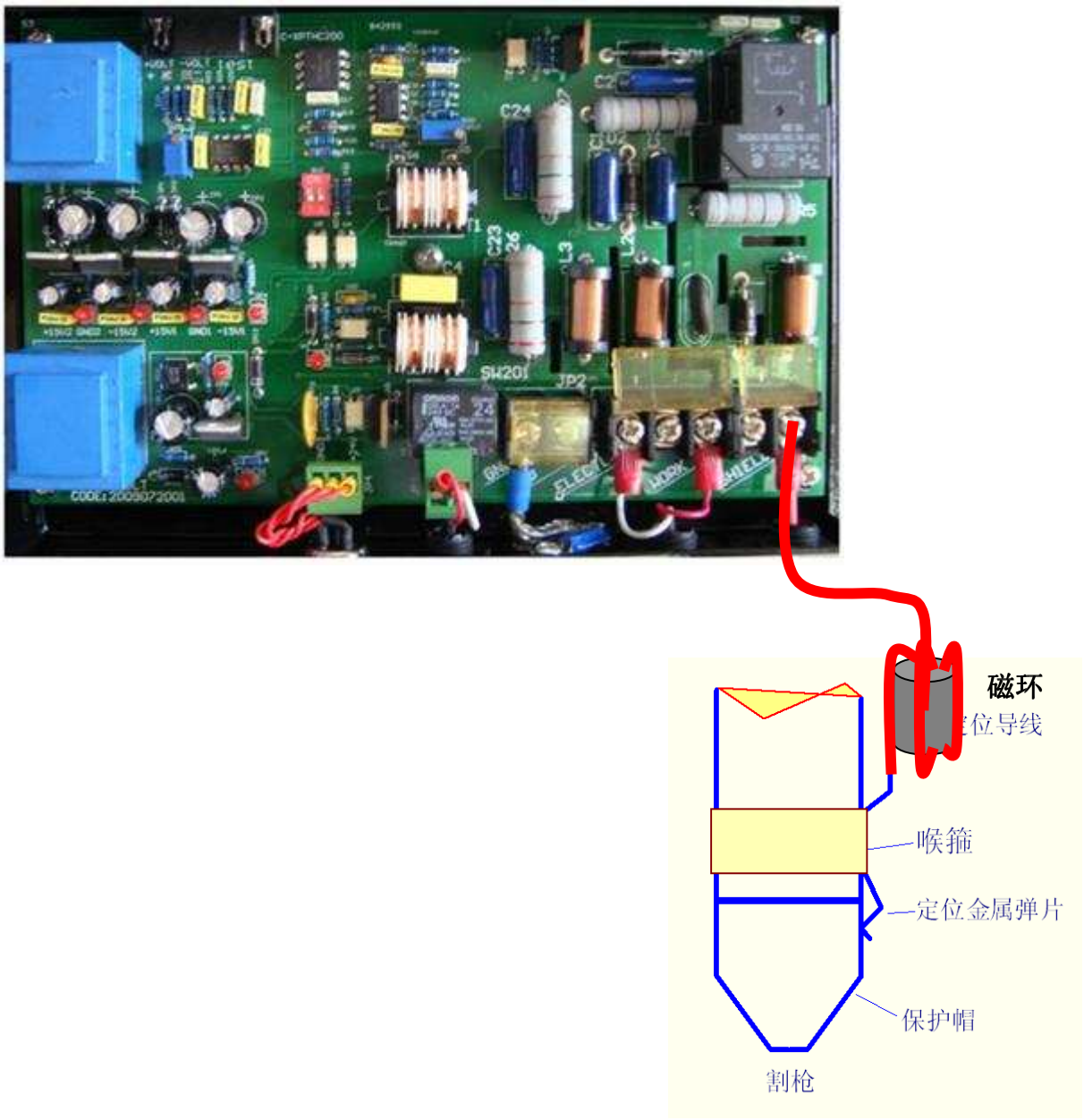


Figure 5-5 Schematic diagram of the protective cap positioning

Working process of protective cap positioning: when the height turner received the arc striking signal sent by NC system, the cutting torch descends immediately, when it touches steel plate, height turner receives positioning trigger signal and controls the cutting torch ascending to set height immediately, when positioning completed, height turner controls plasma arc striking automatically.

Notes of protective cap positioning:

A. Access to protective cap through "SHIELD" on controller.

B. GND column must be in good grounding, cross-section of grounding conductor is

larger than 4mm^2 .

C. Do not need to access WORK from the material frame, which is different from XPTHC-100.

D. The cable connected to the protective cap must be high-voltage cable, our company offers a 4-meter-long high-voltage cable with a magnetic ring, if you have special requirements, please contact HongYuDa.

5.4.3. Arc voltage access port

The arc voltage of plasma accesses at "PLASMA ARC-VOL" on the back of XPTHC-200-IHS, see Figure 5-6.

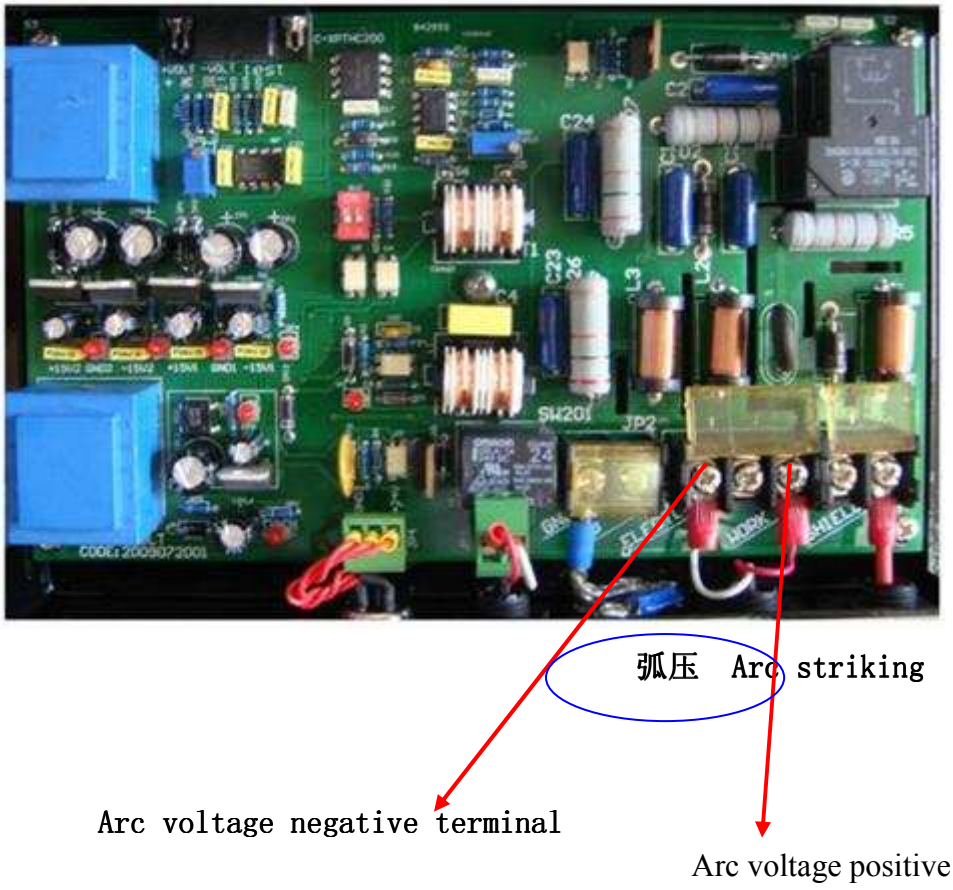


Figure 5-6: Location of arc voltage interface

5.4.4. Arc striking signal access interface

The arc striking signal of plasma accesses to "PLASMA START" of controller.

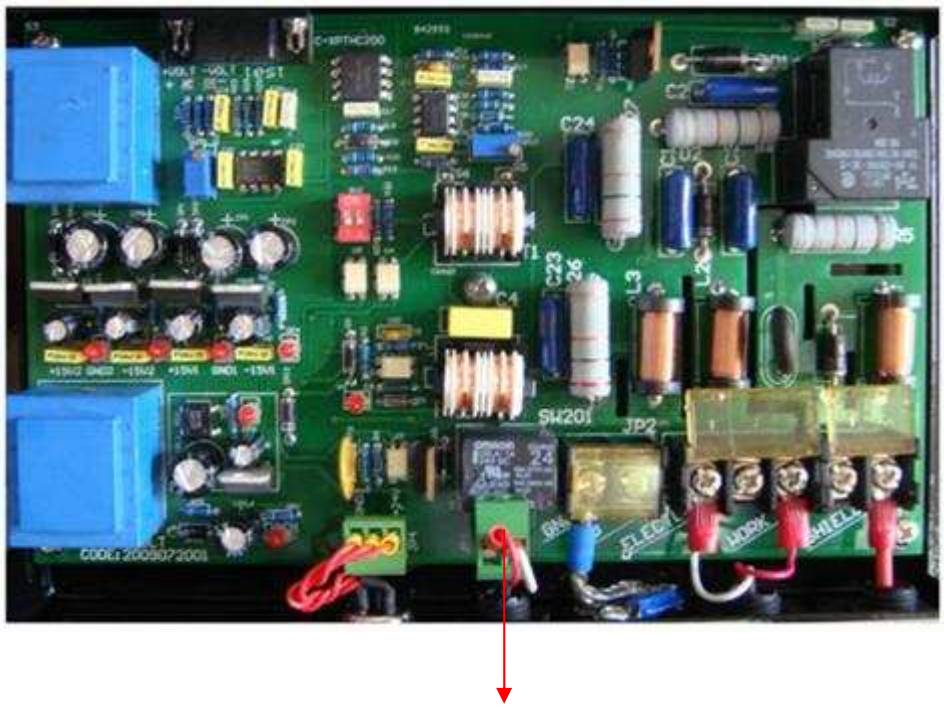


Figure 5-7 (PLASMA START) position of the plasma arc striking wiring

The plasma arc striking signal is controlled by a 5A relay.

6. Control wiring

6.1. XPTHC-200 system wiring diagram (Figure 6-1)

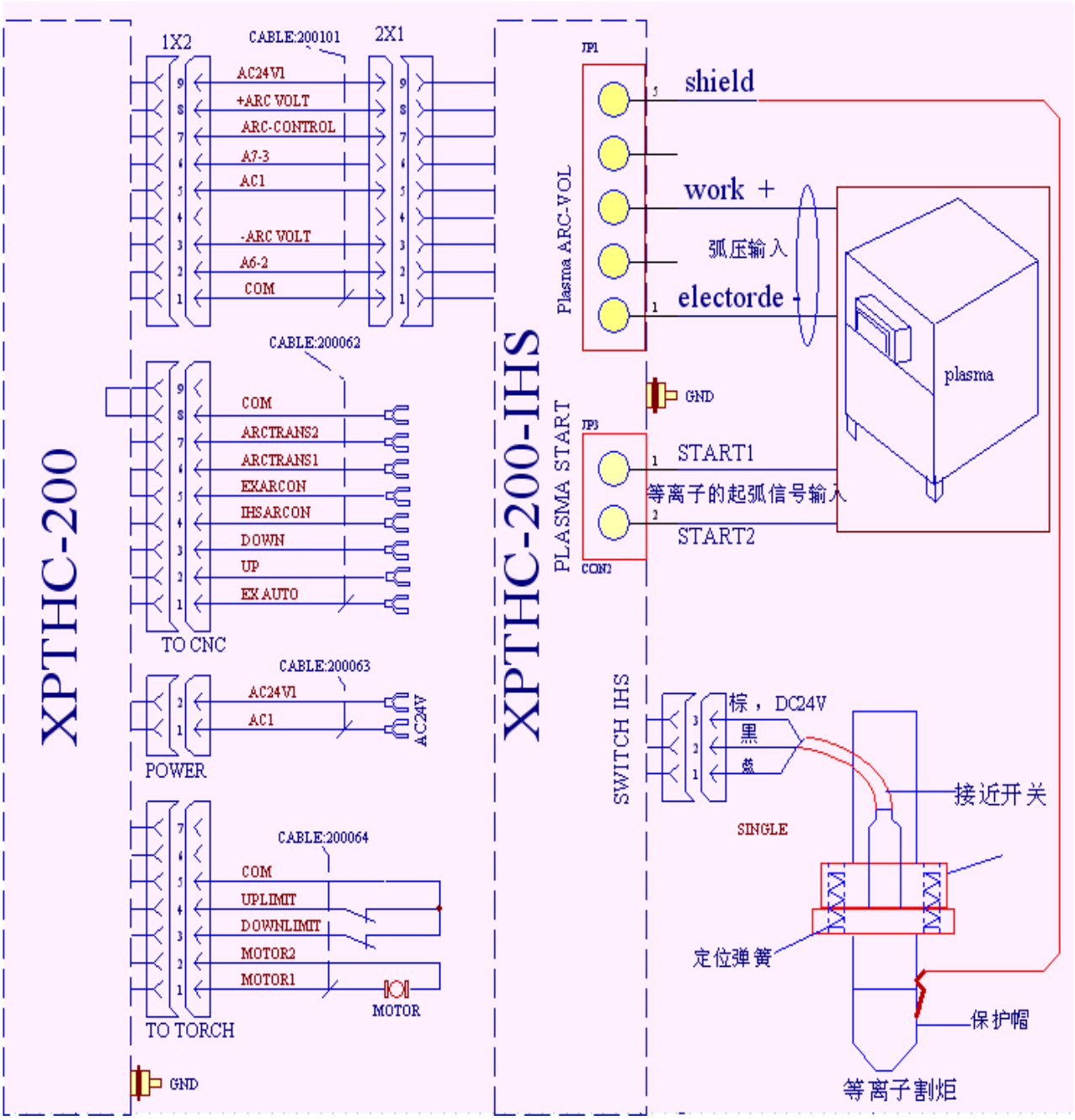


Figure 6-1: XPTHC-200 wiring diagram

6.2. Series connection of two proximity switches

The series connection uses two proximity switches to position, as long as any one proximity switch action, height turner will detect the signal.

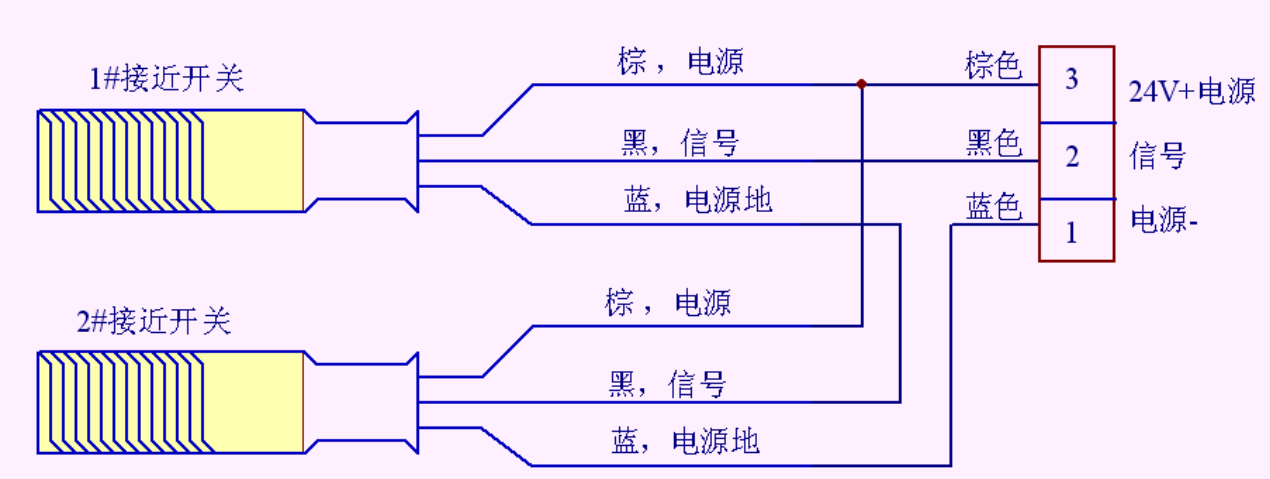


Figure 6-2: Series connection of two proximity switches

6.3. Wiring method of control circuits of XPTHC-200 and HYD modules

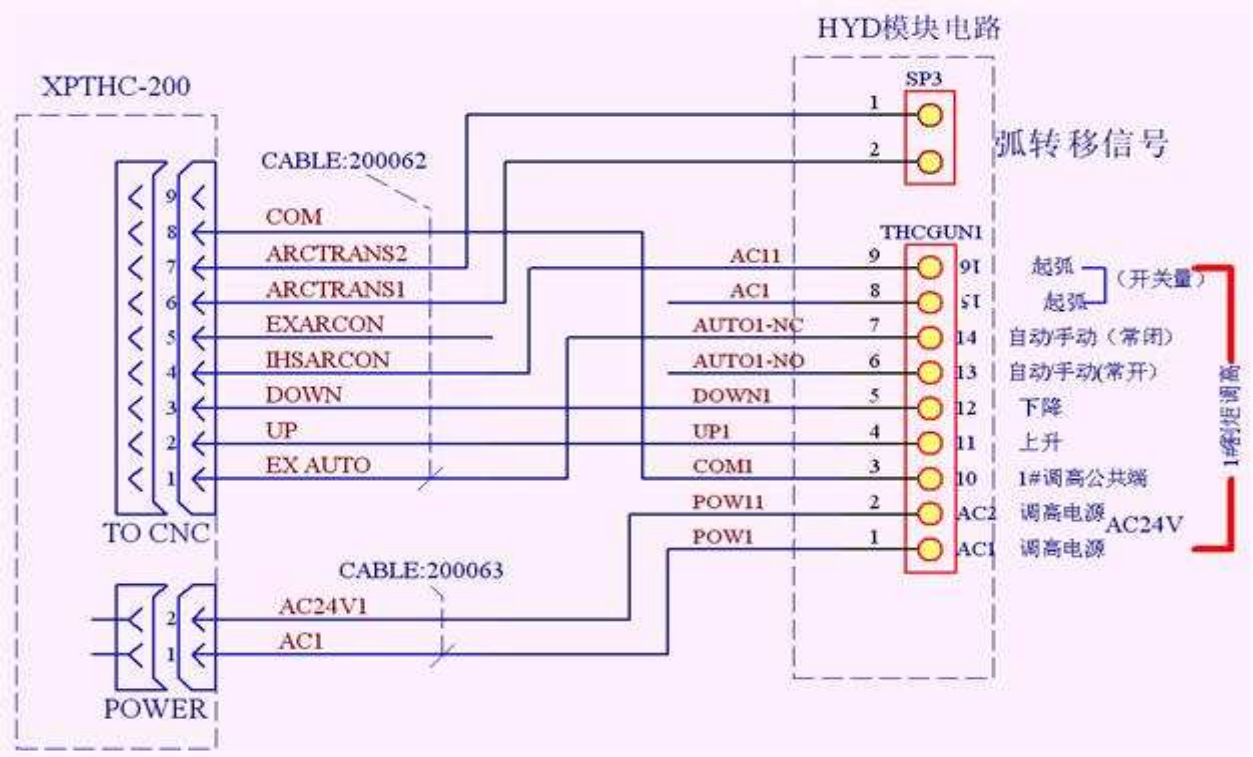


Figure 6-3 Example of NC wiring

7. Failure and maintenance

7.1. Troubleshoot

No.	Fault	Reason	Solution
1	The display has nothing, black	No +5 V voltage	Check +5V voltage VCC5
2	Motor does not run or only in one direction.	Driver IR2110 damaged	Change IR2110
		Drive-level voltage is +15 V, Fault.	Check drive voltage VCC4
		Over current protection	D606∽D609 (IRPF250) may damaged or machine seized.
3	When power on, the cutting gun always elevates. (NPN switch positioning mode)	The proximity switch at upper limit of cutting torch does not installed in place. It is in open state.	Proximity switch installs in place.
		Proximity switch is damaged	Change the switch (Detection distance of 2mm, NPN normally open type)
4	can not automatically arc striking after the completion of initial positioning.	Proximity switch is damaged, no return signal.	Change proximity switch.
		Positioning time is set too short, there is no return signal	To set a longer positioning time.
5	Unstable arc voltage control	1. Check the grounding. 2 Check whether there is leakage of cooling water in plasma power. 3. It is too sensitive.	
6	The machine start to run but perforation is not completed	SET-PIERE time is too short.	1. Make SET-PIERE time longer. 2. Use the arc feedback signal of plasma itself.
7	The plasma start arc striking before the completion of initial positioning.	Using EXARCON signal in arc striking, the NC delay time is too short.	3. Make the NC delay time longer. 4. Electrical circuit fault.

8	Cutting torch can not start arc striking.	1. Make sure the plasma power is in operation. 2. Check initial positioning perforation height is correct. 3. Check wearing parts of cutting torch. 4. There are iron slag near electrode and nozzle results in short circuit when using protective cap positioning.
9	Plasma arc of cutting torch can not be transferred to workpiece.	1. Check the working cable of plasma. 2. Check accessories of cutting torch.
10	Before the end of perforation of cutting torch, cutting torch moves.	3. Extends perforation time in NC system. 4. Make SET-PIERE time longer.
11	NC started to move, cutting torch descends immediately toward workpiece.	1. Increases "given arc voltage" settings. 2. Extends automatic load time in NC system. 3. Reduces the value of over voltage protection, (clockwise adjustment RP104 potentiometer) 4. Check the corner signals or automatic signal of NC system are normal.
12	After the transfer and perforation the plasma arc extinguished immediately.	Delay is too long, (before moving the machine, cutting torch stays too long at the perforation place, plasma arc easy to go out, this is most likely to occur when cutting thin metal plates)
13	When in positioning, cutting torch does not lift when touch steel plate.	1. IHS time is to short. 2. Sensor wire and protective cap being poor contact. 3. Circuit fault.
14	Cutting torch touches plate and still descends, there is no arc striking action.	Detection cables and protective cap are in poor contact in protective cap positioning. Proximity switch is damaged in proximity switch positioning. The sampling signal of height turner are open circuit or poor contact.

15	In automatic mode, cutting torch is oscillating and unstable.	Height turner sensitivity is too high, you can adjust SEN switch to lower its sensitivity. Circuit fault.
16	In automatic mode, height turner tracks too slow.	Height turner sensitivity is too low, you can adjust SEN switch to increase its sensitivity.
17	Arc stopped in cutting process, arc voltage enable signal continues to output, the machine does not stop.	Reason: This height turner detects arc voltage signal, after arc stopped the arc voltage can not come down immediately. Solution: Use the arc feedback signal of plasma itself.

7.2. Cancel elevating function of arc blowout cutting torch:

The function of cutting torch elevating: The lifting system will be seized if the limit equipment does not install. If NC system has the function of automatic lifting control, it can be cancel on master controller of height turner.

There are two ways to cancel the cutting torch elevating function:

1. Canceled R155 resistor on the master control board.
2. Canceled R116 resistor on the master control board.

7.3. Changes arc voltage settings of over voltage protection

The set arc voltage of over voltage protection is 30V, it can be changed by adjusting PR104 on the circuit board: clockwise a circle, the value drops about 4V, otherwise the value improves 4V. To prevent cutting gun from touching steel plate when cutting slotted plate. For example: if the value is too hight, the cutting gun will be easy to touch the steel plate at inlets and outlets, it can change the value by adjust RP104.

Concept: over voltage protection arc voltage definition: the difference between the actual arc voltage and set arc voltage. If the sum of actual arc voltage of arc voltage height turner with over voltage protection is large than set value, height turner will automatically cancel the automatic elevating function.

Attention: The over voltage protection value can not be freely adjusted, if the value is too low, automatic elevating function will not be automatically loaded during the cutting process.

7.4 Some suggestions:

1. In the use of protective cap positioning, it is recommended users to install anti-collision fixture and connect the protective cap positioning, so that in practice if the protective cap does not touch well with cutting plates, the proximity switch positioning also be effective at the same time, which is more help to protect the cutting torch. Two

anti-collision function of positioning are valid under the circumstances of installed two positioning modes.

2. When using proximity switches positioning function, our company proposes to adopt a number of proximity switches to position, wired as in Figure 6-2.

3. When CNC system you used can not receive arc striking enable signal, you should use delay method to control NC operation. Namely, after NC system sends arc striking signal to height turner, delay and enable NC to operate.